Cesium

CAS No. 7440-46-2

General Information

Cesium is a silver-white metal that ignites on contact with air and reacts explosively with water. Cesium compounds can be found naturally in rock, soil, and clay. Cesium inorganic compounds are commonly used in photomultiplier tubes, vacuum tubes, scintillation counters, infrared lamps, semiconductors, high-power gas-ion devices, and as polymerization catalysts and photographic emulsions. Radioactive cesium-137 has been used medically to treat cancer.

Most human exposure to cesium occurs through diet. Little is known about the health effects of this metal. Cesium hydroxide is a corrosive and an irritant. Workplace air standards for external exposure are recommended on the basis of these irritant effects but only for certain salts (NIOSH). It is not known whether cesium compounds are carcinogenic. National agencies (ATSDR, U.S. EPA, NTP) have not reviewed exposure or health effects related to this element.

Interpreting Urine Cesium Levels Reported in the Tables

Urine cesium levels were measured in a subsample of NHANES participants aged 6 years and older. Subsamples were randomly selected within the specified age

Table 21. Cesium

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999-2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% confidence interval)						Sample size
		10th	25th	50th	75th	90th	95th	
Total, age 6 and older	4.34 (4.06-4.63)	1.50 (1.30-1.80)	3.00 (2.70-3.30)	4.90 (4.50-5.30)	7.00 (6.80-7.40)	9.60 (8.90-10.2)	11.4 (10.3-12.5)	2465
Age group								
6-11 years	4.87 (4.19-5.65)	2.10 (1.00-2.90)	3.80 (2.80-3.90)	5.60 (4.40-6.70)	7.30 (6.80-7.90)	9.00 (7.90-9.70)	9.70 (8.80-10.8)	340
12-19 years	4.44 (3.98-4.95)	1.80 (1.20-2.40)	3.40 (2.80-3.80)	5.10 (4.50-5.50)	6.90 (6.20-7.70)	8.70 (8.00-9.40)	10.7 (9.00-12.2)	719
20 years and older	4.26 (3.99-4.55)	1.50 (1.20-1.70)	2.80 (2.50-3.00)	4.80 (4.40-5.10)	7.10 (6.70-7.50)	9.80 (8.90-10.5)	11.6 (10.3-13.0)	1406
Gender								
Males	4.80 (4.45-5.19)	1.90 (1.70-2.40)	3.50 (3.00-3.70)	5.50 (4.90-5.80)	7.40 (7.00-8.00)	9.70 (8.90-10.3)	11.6 (10.3-13.0)	1227
Females	3.94 (3.61-4.31)	1.10 (1.00-1.30)	2.60 (2.30-2.80)	4.50 (4.00-4.80)	6.60 (6.20-7.10)	9.10 (8.20-10.0)	11.1 (9.90-12.9)	1238
Race/ethnicity								
Mexican Americans	4.31 (3.92-4.75)	1.50 (1.20-2.00)	3.00 (2.50-3.40)	4.70 (4.20-5.00)	6.60 (6.30-7.00)	9.10 (8.00-9.80)	10.9 (9.70-12.5)	884
Non-Hispanic blacks	4.93 (4.44-5.47)	2.10 (1.90-2.70)	3.70 (3.10-4.00)	5.40 (4.90-6.10)	7.40 (6.90-8.20)	9.80 (8.80-10.8)	11.5 (10.0-12.8)	568
Non-Hispanic whites	4.23 (3.89-4.61)	1.30 (1.20-1.70)	2.80 (2.40-3.00)	4.80 (4.30-5.30)	7.20 (6.70-7.70)	9.60 (8.80-10.5)	11.8 (10.3-13.1)	822

range to be a representative sample of the U.S. population. Finding a measurable amount of cesium in urine does not mean that the level of cesium causes an adverse health effect. For one small population study (Minoia et al., 1990 and one study of clinically submitted specimens (Komaromy-Hiller et al., 2000), urinary cesium levels were slightly higher than levels reported in Tables 21 and 22. Median values in this current NHANES 1999-2002 subsample are more than twice the median values reported in a non-random subsample from NHANES III (1988-1994) (Paschal et al., 1998). The cause of these differences in the aforementioned studies is not known but may be due to methodologic differences at these low levels.

In the current NHANES 1999-2000 subsample, geometric mean levels of the demographic groups were compared after adjustment for the covariates of race/ethnicity, age, gender, and urinary creatinine. Urinary cesium levels were higher for children aged 6-11 years than for people aged 12-19 years, with both age groups having higher levels than people aged 20 years and older. Non-Hispanic whites had higher levels than non-Hispanic blacks. It is unknown whether differences between ages, genders, or races/ethnicities represent differences in exposure, body-size relationships, or metabolism.

Whether cesium at the levels reported here is cause for health concern is not yet known; more research is

Table 22. Cesium (creatinine adjusted)

Geometric mean and selected percentiles of urine concentrations (in µg/gram of creatinine) for the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999-2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% confidence interval)						Sample size
		10th	25th	50th	75th	90th	95th	
Total, age 6 and older	4.08 (3.87-4.31)	2.38 (2.22-2.61)	3.14 (3.03-3.26)	4.13 (3.96-4.29)	5.41 (5.20-5.71)	7.13 (6.73-7.64)	8.64 (7.78-9.76)	2465
Age group								
6-11 years	5.34 (4.94-5.77)	3.68 (3.04-3.99)	4.46 (4.17-4.69)	5.42 (5.00-6.05)	6.63 (6.09-7.18)	8.23 (6.83-9.90)	9.89 (7.57-10.7)	340
12-19 years	3.34 (3.04-3.67)	2.01 (1.81-2.22)	2.62 (2.41-2.92)	3.52 (3.24-3.73)	4.34 (4.17-4.56)	5.26 (4.84-5.79)	6.67 (5.16-10.4)	719
20 years and older	4.08 (3.86-4.31)	2.40 (2.22-2.65)	3.14 (3.01-3.27)	4.06 (3.87-4.27)	5.38 (5.07-5.71)	7.17 (6.73-7.65)	8.60 (7.77-9.76)	1406
Gender								
Males	3.75 (3.53-3.98)	2.11 (1.90-2.38)	2.97 (2.76-3.12)	3.78 (3.55-4.02)	4.96 (4.69-5.24)	6.44 (6.04-6.90)	7.71 (6.90-8.83)	1227
Females	4.43 (4.16-4.71)	2.63 (2.40-2.86)	3.36 (3.16-3.61)	4.44 (4.20-4.68)	5.92 (5.40-6.40)	7.70 (7.12-8.40)	9.38 (8.00-10.5)	1238
Race/ethnicity								
Mexican Americans	3.98 (3.71-4.27)	2.41 (2.16-2.58)	3.04 (2.86-3.23)	3.95 (3.65-4.12)	5.09 (4.66-5.44)	6.64 (6.00-7.21)	7.96 (7.20-8.95)	884
Non-Hispanic blacks	3.21 (2.88-3.56)	2.01 (1.69-2.29)	2.56 (2.27-2.77)	3.26 (3.05-3.45)	4.30 (3.99-4.55)	5.49 (5.08-5.97)	6.33 (5.90-7.08)	568
Non-Hispanic whites	4.24 (3.96-4.54)	2.54 (2.24-2.86)	3.33 (3.15-3.54)	4.28 (4.05-4.53)	5.63 (5.25-6.06)	7.20 (6.77-7.90)	8.68 (7.65-10.0)	822

needed. No relation has been established between urinary levels of cesium and health effects. These urine cesium data provide physicians with a reference range so that they can determine whether people have been exposed to higher levels of cesium than those found in the general population. These data will also help scientists plan and conduct research about exposure to cesium and health effects.